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S. Africa's Climate of Investment

THE improved undertone of the Kaffir market over the past three months and, more particularly, since the devaluation of the franc, has focused attention on the economic health of the Union and away from the political ills besetting it.

The most recent authoritative survey of the economic situation of South Africa is that given by Dr. M. H. de Kock, Governor of the South African Reserve Bank, who told shareholders in his annual statement that both the internal and external economic situation of South Africa appeared to be sounder and more stable than they have been for some time. His view was that there was no question of a recession or downturn in the total volume of economic activity in South Africa, but merely a substantial decline in the annual rate of increase during the past three years as compared with that during the period between 1947 and 1955. This slowing down in the tempo of private development was, in fact, a source of welcome relief as he believed that mining and industrial development had proceeded at too rapid a pace and, in consequence, had resulted in various complications and bottlenecks. The slower rate of private development had served to bring about a better balance in South Africa's economy as a whole, for it enabled the public sector to make more rapid progress in its efforts to catch up with the backlog in transport, power, telecommunications and other services.

Looking ahead, Dr. de Kock said a further increase in South Africa's gold and uranium output could be expected, although at a somewhat slower rate than that achieved during the past two years. The production of gold should expand because of the higher grade of ore worked in the new mines, the increase in the milling capacity of these new mines and, finally, because of the improved supply position for labour. The output of uranium should also move to higher levels as one large new uranium producer had just begun operations and there were others which had yet to reach full production.

Taking a more general view, the Governor declared that there was again a prospect of a larger volume of exports, not only as a result of increased production of farm and mineral products as well as of processed goods for export, but also on account of the increased carrying capacity of the railways.

The situation outlined by Dr. de Kock certainly reflects a healthy state of affairs and, search as one might, his survey carries no mention of any serious basic defects in the South African economy. Nevertheless, he was not unmindful of the political situation which, understood or misunderstood, prevented the basic strength of the economy from being viewed in a favourable light by investors abroad.

That this is the position may, however, be inferred from his statement that circumstances call for special endeavours to raise new loans from abroad for both the public and private sectors, and to attract risk capital for development. For that purpose, South Africa must face the fact that to attract its fair share of the limited supply of capital, it would be necessary not only to direct its energy to this end, but also "to maintain a favourable climate for investment". To secure this favourable investment

climate Dr. de Kock placed a great deal of weight on the co-operation of the Ministers of Finance and of Economic Affairs who have already gone some distance towards making their contribution to a revival of South Africa's economic expansion.

With regard to gold mining, a more favourable attitude is discernible in the concessions granted to the new ultra deep-level mine and in the inquiry being made into the position of the marginal mines. Similarly, on the industrial front, the Finance Minister has raised the ceiling of duties he can apply to dumped imports while the Minister of Economic Affairs has announced the terms of reference of the commission he proposes to examine the Union's tariff structure.

In each case, the attitude is more important than the event and it is, perhaps, a pity, as has been pointed out, that similar co-operation has not been forthcoming from the Minister of Native Affairs. It is a widely held opinion that he, more than anyone else, could bring about the required "favourable climate for investment".

Whether or not sterling will resume its inflow to the Union on any material scale must, therefore, depend on what can be done between now and the General Election next spring. In any event, the position is quite clear: without a generally acknowledged favourable climate for investment, capital development in the Union will progress very slowly. On the other hand, if a less intense ideological policy is pursued, the prospect of sterling flowing into South Africa on the scale reached in 1947-1948 may well be effected with attendant benefits to both countries in general and to Kaffirs in particular.

BOREHOLES IN BRITAIN

The Department of Scientific and Industrial Research in its report for 1955-56 furnishes interesting details of the borehole drilling accomplished in the British Isles during the period under review.

During 1955 the Geological Survey received notifications of 750 boreholes under the terms of the Mining Industry Act of 1926 and the Petroleum (Production) Act of 1934. Of these, 29 were for oil or gas, 631 for the purposes of the National Coal Board, and the remaining 90 comprised 36 for limestone and cement materials, 15 for gypsum, 13 for fireclay, 9 for salt and other evaporites, 7 for lead, 4 for iron ore, 4 for clay and one each for fuller's earth and barytes. The boreholes thus offer a fair index of the prospecting and production of minerals in Britain.

In the same year nearly 235,000 ft. of strata were examined from boreholes previously notified. About 200,000 ft. related to N.C.B. boreholes. Many of the National Coal Board's boreholes fit into long-term schemes of exploration. The Board is already exploiting the results of some of the earlier ones as, for example, its decision to establish the colliery at present being sunk at Bevercotes, in Nottinghamshire. This decision rested upon the results of several boreholes sunk during and since the war. The sinkings now in progress at Cotgrave in the same county and at Agecroft, in Lancashire, were preceded in each case by a number of boreholes. Indeed, it is increasingly the practice of the Board to explore new areas for major collieries by means of a number of boreholes on a grid pattern.

Seven boreholes were completed in 1955, including the Rudry in Glamorgan. Over 9,000 ft. of rocks were cored and over 24,000 specimens collected from them.

The borehole at Archerbeck, Dumfriesshire, was successfully completed in that it gave a detailed record of the

Lower Carboniferous sequence down to a depth of 4,273 ft. Boreholes at Wyboston, Bedfordshire, and Soham, Cambridgeshire, were drilled to ascertain the Mesozoic and sub-Mesozoic sequences in areas for which memoirs are being written. Both boreholes supplied new and useful information.

To assist the interpretation of the revision mapping of the Chesterfield Sheet, four boreholes have been drilled in the Ashover district north-east of Matlock. Here the more accessible fringes of a large region of concealed carboniferous limestone have long been notable for the production of lead, zinc and fluorspar. From these drillings it appears that the shape of the concealed surface of the carboniferous limestone between Ashover and Matlock can be calculated with some approach to accuracy, supplementing the levels proved in the boreholes with inferences from the inclination and lateral variation in thickness of the overlying Millstone Grit.

This calculation is an essential preliminary to any widespread working of the minerals that may be undertaken in the future.

CORUNDUM-SILLIMANITE IN SOUTH AFRICA

The Pella corundum-sillimanite deposits in South Africa represent an important reserve of refractory material with a high alumina content that has been utilized since 1954 by Western Germany for the manufacture of furnace linings. The deposits consist of three adjoining base mineral claims called Swartkoppies, Honger Vlakte and Pella West, each measuring 472 morgen. They are accessible by road from practically all directions and the Springbok-Upington highway, 18 miles from the property, is used by the company to transport the ore to the railhead at Kakamas. The major occurrences are at Swartkoppies and Pella West. The only other important surface showing is at Pella East, which is covered by the Swartkoppies claim. South of the Swartkoppies claim is another showing, that resembles Pella West but is much smaller.

The Pella West deposits lie between the Bushmanland plateau in the south and the highly dissected valley of the Orange River, which passes about 8 miles to the north, on a flat low-lying and partly sand-covered terrace in the south-western corner of the Pella Mission Farm. The farm is in the Namaqualand district about 90 miles from Springbok and about 108 miles from the railroad at Kakamas, in the north-western Cape.

The corundum-sillimanite deposits occur as a sheet of blocks and boulders, some weighing as much as 50 tons, varying in size from less than 1 foot to over 10 ft. in dia., scattered over approximately 200,000 sq. yds. It is important to note that the Pella deposits are not the only alumina-rich occurrences in this general district. About 25 to 28 miles west of Pella are a number of smaller occurrences of practically pure sillimanite that were being worked for this mineral during the last half of 1955.

The Swartkoppies deposits, which were pegged in January, 1950, are in an extensive alluvial flat near the southern boundary of the terrace on the Pella Mission Farm. As indicated by its name, it occurs in the form of numerous small, remarkably dark hills. Together, these small hills constitute a small range that extends east and west and occupies an area of about 200,000 sq. yds. The average mineral composition of this ore is, by per cent: sillimanite, 53; corundum, 41; ilmenite, 2.77; and rutile, 1.19.

The available reserves at Swartkoppies and Pella West totalled approximately 400,000 s.tons at the end of June,

1955, which, at the rate of 1,000 tons production a month, should give an assured operation of about 33 years. These figures refer, however, only to ore actually cropping out above the alluvium. So far, all production, 900 to 1,100 tons a month, has come from surface workings at these two deposits. All that is required to recover the ore is to break the rock into various sizes required by the respective buyers, and to sort it according to size and grade. Because of the extreme hardness of the ore, most of the breakdown is by mud blasting, the maximum size permitted being 12 to 15 in.

The Pella East deposit is about $\frac{1}{2}$ mile east and at a slightly lower elevation than that of the Swartkoppies deposit. An extensive layer of alluvium of unknown thickness separates the two deposits.

The Pella East deposit consists of small piles of corundum-sillimanite blocks that barely protrude above the surface of the alluvial cover. Trenching off of the ends of the showing has disclosed similar blocks at depths of 10 to 15 ft. but not penetrating to the bottom of the alluvium. The blocks are piled on one another and not scattered about as they are at Pella West, which suggest that erosion has been less complete here; if so, the occurrence may bear a closer resemblance to Swartkoppies than to the Pella West deposit.

The present difference in the make-up of the Pella deposits and the bodies towards the west may be due to original differences in composition, although it represents more likely a phase difference in the general metamorphosis of the area. Thus, the deposits in the western sector apparently retained most of their original silica while the Pella deposits were impoverished in this component by desilication. For this reason the Pella deposits are to-day richer in alumina than are the sillimanite deposits in the area towards the west.

The fact that the Pella deposits are the metamorphosed products of alumina-rich sedimentary bodies and the possibility that similar bodies may be present in the same stratigraphic horizon should greatly facilitate exploration in adjacent areas.

MINERAL FINDS IN SOMALILAND

Some interesting finds are recorded by the Geological Survey of Somaliland in its report for the year ended March 31, 1957.

A detailed surface investigation of tin-bearing quartz veins in the Elayu area, Erigavo District, showed considerable promise, as a result of which a mining company has taken out a special exclusive prospecting licence and mining leases over the area and is prospecting in more detail.

A mining lease held at Henweina in the Laferug area for mica, beryl and columbite was surrendered at the end of 1956. During the year some 16 tons of beryl and 15 cwt. of columbite were exported. Production was mainly from detritals and little serious development work was done. The columbite had originally been discovered by the Geological Survey in 1953.

Samples of samarskite, allanite and monazite, which had been found in the 1955-56 field season and provisionally identified, were later confirmed. An interesting pegmatite swarm was mapped in the Gebile district west of Hargeisa, where beryl was noted, and in the same area basic rocks with local deposits of talc were mapped. Traces of copper were also found. Some prospecting and more detailed work is being undertaken in this neighbourhood.

MINERAL STRIKES IN PAKISTAN

Rich mineral strikes have been made in the Quetta and Kalat Divisions of Pakistan, according to the Geological Survey of Pakistan, quoted by our correspondent in that country. Considered important was the discovery of several new chromite deposits, while other minerals discovered were dalbandin, copper and iron ore in Ras Koh, manganese ore in Lasbels, vermiculite in Ras Koh, fluorite in Kalat and barytes and asbestos in Zhob. In the Quetta Division of West Pakistan, chromite has been mined over a number of years and has been earning foreign exchange. Some 30,000 tons are exploited annually.

The government is planning the extensive mining of coal in Quetta and Kalat Divisions, in addition to the existing coal exploitation in the Deghari Sor range, Khost and Sharigh areas. Recently definite indications of gold in the Chagai District of former Baluchistan have been available, though it is not yet established whether the deposits would be profitable propositions. In the same district considerable deposits of a relatively rare variety of marble of composite white, yellow, green and red colours, known as onyx marble, have been discovered. These deposits have been surveyed and mines have been planned.

Meanwhile, a meeting of the mine owners of Quetta and Kalat, convened by the Coal Mines Labour Welfare Commissioner at Quetta to consider the development of the mining industry, appointed a seven-man committee to submit development plans.

COPPER PROSPECTS IN SOUTHERN RHODESIA

The report of an economic survey of Southern Rhodesia's Eastern Districts reveals the long-term possibilities for copper development in the area. This Federal report, made public early this month, describes the survey as covering a land area of about 170 miles long by 25 miles wide, including the town of Umtali. There is a great deal of conjecture on the extent and value of a pitchblende find about 10 miles south of Umtali, but so far atomic energy officials have referred only to "traces" and no information is available whether there is a workable deposit.

Referring to copper, the survey says there is an exclusive prospecting reservation order covering an area near Umkondo of about 100 sq. miles on the west bank of the Sabi river. It also quotes a geologist as saying that a copper reef near Odzi contains a rich ore assaying from 12 per cent to 14 per cent copper with the remainder averaging between three and seven per cent.

It is pointed out that atomic minerals and copper are long-term possibilities, but that the prospects of any significant increase in mining activity in the Eastern Districts in the near future appear to be limited. Economically the Eastern Districts are now undergoing a period of consolidation after a period of rapid development during post-war years. Under present circumstances few immediate prospects appear of an expansion of general manufacturing industry in the area—except where supported by the availability of some local raw materials.

Yet the report also says that provided certain conditions are fulfilled, there seems no reason why the industrial structure of Umtali should not be as prosperous as elsewhere. The conditions are a careful selection of new industrial enterprises, a reduction in labour costs and a sustained improvement in communications.

Developments in the Japanese Mining Industry

THE geology of Japan is varied and complex and a large variety of minerals occur in the country. However, Japan is not self-sufficient with regard to its mineral supplies, and remains a large importer of minerals and mineral products.

Production of iron, steel and aluminium is largely dependent upon imports of raw materials. Sulphuric acid is manufactured from pyrite and as a by-product in the smelting of copper, lead and zinc ores. The country imports about 1,000,000 tons of salt every year, the annual national production in recent years being approximately 450,000 tons per annum. Non-ferrous metals produced include gold, silver, copper, lead, zinc, tin, mercury and antimony. Other by-products in refineries include bismuth, cadmium, palladium, platinum, selenium, tellurium, arsenious acid, copper sulphate, nickel sulphate, zinc sulphate and zinc oxide. There are also large resources of coal and lignite in Japan, but the country produces barely 10 per cent of petroleum requirements.

Metals and ores in adequate domestic supply are arsenic, bismuth, cadmium, copper, pyrite, silver and zinc. Non-metallic minerals in adequate domestic supply are abrasives, asbestos, bentonite, silica brick stone, diatom earth, dolomite, dunite and serpentinite, felspar, fireclay, low-grade gypsum, limestone, pottery stone, pyrophyllite, silica sand, sericite, and sulphur.

Partial dependence on imports is necessary in respect of certain ores, namely antimony, chromite, iron, lead (and lead metal), mercury, molybdenum, tin metal and titanium; and also certain non-metallic minerals namely, high-grade asbestos, barite, fireclay of high grade, fluorite, flaky graphite, gypsum and kaolin.

Complete dependence on imports is necessary in the case of the following metals, ores, and non-metallic minerals: aluminium ore, cobalt, magnesium, manganese ore, nickel ore and matte, platinum, tungsten ore, vanadium, bauxite for refractories, earthy graphite, magnesite, mica, phosphate and potash ore.

Located on the west coast of the main island of Japan, the Kamioka mines lie in the Japanese Alps and are re-

puted to be the largest lead-zinc mines in the country. The mines have yielded about 48 per cent of Japan's total production of zinc since 1925.

The Kamioka property is worked by the Kamioka Mining and Smelting Co. Ltd. which, in 1952, was renamed the Mitsui Mining and Smelting Co. Ltd. The company owns 20 kilometres of private railway from Inotani railway station. The zinc concentrate from the Zawar mine is smelted in one of the company's smelters.

Reputed to be one of the most important metal mines in Japan, Kamioka is equipped with modern mining machinery, ore dressing plants and flotation units. The property undertakes electrolytic lead refining by the Bett process, electrolytic zinc refining by the Tainton process, production of sulphuric acid by the Monsanto contact process as well as the recovery of gold, silver, bismuth and cadmium. It is considered to be the most progressive mine in Japan. Graphite is also recovered from the smelter and refinery at Kamioka.

Custom ore purchased from two neighbouring mines, and gold-silver-bearing ore from the Shimonomoto mine, 20 miles from Tochibora, are also treated with the Kamioka ore.

The largest orebody at Kamioka is 260 m. long and 70 m. wide, the depth of mineralization persisting beyond 500 m. below the surface. Sphalerite and galena constitute the most important ores, the ratio of zinc to lead varying commonly between 5:1 and 10:1. The galena is argentiferous, one ton of lead concentrate (70 per cent Pb) containing 2,500 - 3,000 gm. of silver. Small amounts of many other minerals are present.

Other Lead-Zinc Producers

Lead-zinc ore is worked from three different mines, namely Tochibora, Mozumi and Maruyama. In exploitation of the large deposits, the ore is usually mined by overhand stoping and backfill, the fill originating from the surface. Due to the firmness of the country rocks, little timbering is completed in the mines. Output per man-day is about 4.5 tons.

The company owns five hydro-electric power plants with a total capacity of 9,650 kW. Further expansion of these power plants is proposed. There are three mills in the area. That at Tochibora has a capacity of 1,400 tons per day. The other two mills are situated at Shikama and Mozumi and are of 11,000 and 400 tons per day capacity respectively.

At Shikama the ore is conveyed from the mines to the mill where it is hand-sorted before and after preliminary crushing and 10 - 35 per cent of the waste is sorted on a picking-belt. Preliminary crushing is carried out in the first instance by jaw crushers, then by gyratory crushers and subsequently by cone crushers. At -10 mm. size, the crushed ore is led into ore bins.

The material from the ore bins is fed into the ball mills for final grinding. From this point it is transported to the classifiers and eventually to the differential flotation system. The lead concentrate contains 70 per cent lead, the recovery being of the order of 88 - 92 per cent. The tailings from the lead concentrate, containing some zinc, are led to zinc flotation units for the recovery of the zinc. The rejected tailings contain 0.02 per cent lead. Altogether, 700 tons of lead concentrates are produced every month.

The zinc concentrate contains 59 per cent zinc, the recovery being of the order of 95 - 97 per cent. About 6,000 tons of zinc concentrate is produced each month. Zinc concentrate tailings are led to the settling tanks for further

Writing on recent trends of mineral development in Japan in *Indian Minerals*, Vol. 10, No. 4, B. C. Roy, Geological Survey of India, presented a picture of Japanese mineral resources and offered impressions on the present trends of mineral development in that country. The article, here condensed, is the result of a visit to Japanese mines, mills, smelters and refineries during 1955.

recovery of zinc, the rejected tailings containing 0.1 per cent Zn. The zinc concentrate contains 0.2 per cent Cd.

Company	Reserve† (000,000 tons)	Gold (gm./ton)	Silver (gm./ton)	Lead %	Zinc %
Tochibora*	23.8	—	33.0	0.42	5.0
Maruyama*	8.3	—	26.0	0.31	4.5
Mozumi*	3.6	—	32.0	2.51	8.5
Shimonomoto†	0.48	12.0	788.0	5.3	—

* Lead-zinc ore † Gold-silver ore ‡ Estimated

The various products of the Kamioka smelter and refinery are:

Product	Metal %	Capacity*	Output**
Zinc†	99.99	1,500 tons	1,500 tons
Lead†	99.99	600-650 tons	650 tons
Silver†	99.99	2,500 kgs.	2,000 kgs.
Bismuth†	99.97	3,500 kgs.	2,150 kgs.
Cadmium†	99.97	5 tons	5 tons
Gold†	99.98	2 kgs.	2 kgs.
Sulphuric acid (a)	—	2,500 tons	2,500 tons
Zinc dust (b)	99.0	—	30 tons
Graphite (c)	—	—	42 tons

* Designed monthly ** Average monthly † Electrolytic
‡ Refined (a) 98 p.c. (b) From slab zinc (c) 90 p.c. C.

The Mitsui Mining and Smelting Co. Ltd. has a team of geologists, mining engineers and chemists working to discover new orebodies on the company's concessions.

Hitachi Copper Mine

Located at the Pacific seaboard about 100 miles from Tokyo, the Hitachi mine is one of the most important copper mines in Japan. It is a subsidiary of the Nippon Mining Co. Ltd., reputed to be the largest copper producer and a leading petroleum company in Japan. Nippon has under its control 32 mines, three smelters, two metal refineries and a petroleum refinery. The company employs 15,000 workers.

The main products of Hitachi smelter and refinery are electrolytic copper, electrolytic gold, electrolytic silver, platinum, palladium, selenium, copper wirebars, powder and sulphate, nickel sulphate and sulphuric acid. The refinery is equipped with a cathode melting reverberatory furnace having a monthly capacity of 2,000 tons of copper.

There are two Lurgi-type contact acid plants for the manufacture of sulphuric acid, using vanadium catalyst, each with a capacity of 100 tons (100 per cent acid) per day. One plant, set up in 1939, obtains its sulphur from the roasting of pyrite, whereas the other, operating since 1951, utilizes the waste gas from the copper smelter. This successful utilization of waste gas in a contact acid plant, the first of its kind in Japan, is conducive to the higher recovery rate of sulphur and a decrease in the extent of atmospheric contamination.

Pyrite ore and copper concentrate are separated by flotation. The former is used for the manufacture of sulphuric acid and the latter is treated at the smelter for blister copper, which subsequently goes to the refinery for the refining of copper and for the recovery and manufacture of various by-products.

Recent improved technique has been successful in lowering the grade of copper in the pyrite concentrate to nearly 0.1 per cent in the mill, thus enabling the pyrite sinter containing 55 per cent iron, to be used by the iron smelters. About 2,000 tons of pyrite sinter are sold every month to the iron smelters.

Altogether, about 60 important orebodies have been located at Hitachi. These orebodies roughly cover an area 2,000 m. long and 1,000 m. wide, the depth of mineralization persisting beyond 650 m. below the surface. The orebodies are very complicated in structure.

The Hitachi mine is known already to have raised

20,000,000 tons of ore, equivalent to 300,000 tons of electrolytic copper during the last 50 years. The average tenor of ore has been of the order of 1.5 per cent copper. The ore reserve, as assessed to date, is believed to be 10,000,000 tons with an average content of 1.1 per cent copper.

The up-to-date underground workings, 2,500 m. in length and 1,000 m. wide, are exploited by 11 shafts, although the present operations are limited to four shafts. There are 15 levels generally 50 ft. apart, the deepest important workings being located 600 m. below the surface of No. 1 Shaft, i.e. 250 m. below sea level. The latest shaft, No. 11, uses a skip hoist of three compartments, one for men and equipment, one for ore and one for fine ore. The main sumps into which all underground waters are pumped are located about 200 m. above sea level and the water is led subsequently into the sea by gravity.

The mine is equipped with modern machinery, and has its own hydro-electric generating plant about 50 miles north of Hitachi. This plant supplies about one-third of the mine's power requirements, the remainder being purchased from other sources. Total requirements are of the order of 6,000,000 kW. per month.

Not far from the mine, the Motoyama mill has a capacity of 40,000 tons per month. The ore is brought to the mill by aerial ropeway. After crushing, screening and grinding, the product is passed on to the classifiers and concentration is accomplished both by heavy-media separation using ferro-silicon as the medium, and by flotation. The products are separated as copper concentrate and pyrite concentrate.

The average composition of the ore mined, copper concentrate, pyrite concentrate and tailings from the mill is:

Material	Copper (%)	Gold (gm./ton)	Silver (gm./ton)	Sulphur (%)
Ore mined	1.07	0.4	4	17.70
Copper conc.	17.07	4.0	40	32.72
Pyrite conc.	0.12	0.3	3	46.00
Old tailings	0.55	0.3	3	6.50
Tailings (fill)	0.09	0.2	2	1.96

The average monthly output of ore mined is of the order of 30,000 tons, the average output of copper and pyrite concentrate being 2,000 and 11,000 tons respectively. About 10,000 tons of old waste tailings are recovered every month for treatment.

The various products from the Hitachi smelter and refinery are:

Product	Grade (%)	Production (a)
Copper*	99.99	1,800 tons
Selenium	99.99	800 kgs.
Silver†	99.99	1 ton
Gold†	99.99	100 tons
Platinum	99.99	1 kg.
Palladium	99.98	500 gms.
Nickel†	21.6	10 tons
Copper†	25.6	150 tons
Copper††	25.6	150 tons
Sulphuric Acid¶	50.0 (b)	6,000 tons

* Electrolytic † Refined bars ‡ Sulphate crystals
†† Powder sulphate ¶ 98 p.c. (a) Average monthly (b) Be.

The Geological Survey of Japan was formally established in 1882. In recent years the Survey's attention has been diverted to sheet mapping and long-term systematic mineral investigations. Established in 1952 as a result of the amalgamation of the Fuel Research Institute and the Mining Technical Research Institute, the Resources Research Institute in Tokyo is mainly connected with problems relevant to the conservation, development and utilization of the mineral resources of Japan. A further source of Japanese research is the Mining and Metallurgical Research Laboratory of Mitsubishi Metal Mining Co. Ltd.

Handling of Taconite Pellets

THE immense taconite reserves of Minnesota and the "jaspers" of Michigan have attracted attention for many years as potential sources of iron ore for the expanding requirements of U.S. steel production.

Research on taconite began in 1915 and as far back as 1922 the production of sinter was undertaken by the Mesabi Iron Co., who found it impossible to compete with the direct shipping ores of the Mesabi Range. In recent years advances in mining and metallurgical techniques have led to renewed interest in the potentialities of these low-grade ores.

Advanced Plants

After heavy expenditure on research and development, several taconite plants are now being built, of which the largest and also the most advanced to production are those of the Reserve Iron Co. and the Erie Mining Co. It has been predicted that pellets will provide more than 30 per cent of the furnace feed used by the U.S. steel industry in 1984 and that more than half of this supply will come from domestic sources.

Erie Mining Co. has been operating a "preliminary plant" since 1948, during which period it has produced 100,000 tons annually, and this company is reported to be more than half-way towards completion of a plant with a planned annual capacity of 7,500,000 tons of pellets—the largest in the world.

The development of new pelletizing processes and the construction of new facilities have presented many challenging problems, not the least of which have been the handling and transportation of the finished pellets. The exciting prospects for this new branch of the mining industry and the novel techniques employed give more than usual interest to a paper entitled "Problems of Carloading, Stockpiling,

and Loading Vessels at Lake Erie Mining Company", presented by L. O. Millard, assistant general sales manager of the Link-Belt Co., Chicago, at the April, 1957, meeting of the American Institute of Mining, from which the following information is extracted.

Erie will produce finished pellets at Hoyt Lakes, Minnesota, where the plant is located near the orebody. The taconite ore will be mined, crushed, ground, concentrated and pelletized, and the pellets will be hardened in shaft-type furnaces. From the plant at Hoyt Lakes the finished pellets will be transported for 73 miles on the company's own railway to its new port facility at Taconite Harbour, Minn. Entire trains of special bottom dump cars will discharge the pellets into a concrete track hopper about 1,200 ft. long, situated above the dock, from which they will be withdrawn, weighed and loaded into lake vessels by a unique system of shuttle belt conveyors.

Necessity of Stockpiling

It is planned to operate the Hoyt Lakes plant throughout the year, but pellets will be dispatched to Taconite Harbour only during the Great Lakes navigation season—about seven months per year. This seasonal imbalance between the two operations involves stockpiling the pellets during approximately five months of winter.

The paper is limited to the handling of finished pellets at only two stages. These are: (1) the loading station at Hoyt Lakes for loading railway wagons during the navigation season, which is integrated with the system for stockpiling pellets in the winter; and (2) the facilities at Taconite Harbour for receiving pellets from wagons, and for weighing and loading them into lake vessels.

The pelletizing plant will operate for 24 hours a day, and the finished pellets will be conveyed on one of two duplicate belt conveyors to the 800-ton surge bin of the wagon pocket. These conveyors, and the entire wagon-loading and stockpiling system, are designed for an initial capacity of 1,040 gross tons per hour, including surges. Provision is made for a possible future increase to 1,870 gross tons per hour. The wagon pocket is designed to load the 85 gross ton wagons on one track during normal operation at the full capacity of the plant.

The pellets are fed from the bins by a double reciprocating feeder and are lowered into the cars by means of a shuttle belt conveyor with a hinged loading boom. The rate of loading and trimming of wagons is controlled by an operator from an elevated, enclosed cab between the tracks. A second track is available beneath this bin on which the wagons may be loaded in an emergency by means of motor-operated undercut gates.

In case of wagon delays beyond the surge capacity of the 800-ton bin, the flow of pellets may be diverted to an emergency belt conveyor which conveys them to a temporary stockpile of about 13,000 tons. Should the wagon delay exceed the capacity of this temporary stockpile, the pellets may, of course, be recast by shovel, or the entire flow may be diverted to the winter stockpiling system.

A Large Unit

During the winter the wagon pocket is by-passed, the flow from plant conveyors being routed to a travelling stacker. All belts are 42 in. wide and are designed for an initial speed of 300 f.p.m., with provision for a future speed of 525 f.p.m.

The belt conveyor stacker is the largest unit of its kind in the U.S. and probably in the world. The conveyor boom

structure has a radius of 275 ft. and is mounted on a rotating base carried by eight fully equalized trucks, each with a hydraulic levelling device. The stacker is designed to bed a pile 90 ft. high, 550 ft. wide at the top, and about 800 ft. wide at the base. It travels at a speed of 10 f.p.m. on a pair of ballasted sectional tracks (60 ft. centres). As the pile is built up during the winter, the stacker and its trailing conveyor will retreat for an average of about 7 ft. per day, the tracks being removed behind it to facilitate shovel reclaiming in the summer.

The stacker boom will rotate through an arc of 180 deg. at speeds of from 2 to 32 f.p.m. at the outer end. The boom is hinged vertically, so that pellets may be discharged at any elevation from ground level. This feature will reduce the drop of pellets when a new pile is started. It also permits bedding the pile from the bottom to the top, which may result in less abrading or spalling off of the pellet surface than when the entire flow is discharged to the crest of the pile.

The Outstanding Problems

The following are the problems which stand out as being of particular importance in this system:

1. The behaviour of the pellets on belt conveyors and the maximum angle of inclination for practical operation.
2. The weather, with temperatures of -45°F. in the winter, along with blinding snowstorms and high winds.
3. The temperature of the pellets, which will be cooled to 250°F. on the surface, but will probably have far higher internal temperatures.
4. The dusty conditions that may prevail at the transfers.
5. The 24-hr. operation, requiring a high degree of dependability of the system and its components, and the need for alternative routes of flow.

Exhaustive tests in 1953 indicated that a cross-section of pellets of about 90 per cent of a conventional "B" belt loading could be conveyed up quite steeply-inclined belt conveyors without spillage, so long as the feed to the belt continued at a fairly uniform rate. When the feed was interrupted, some of the pellets contained in the last few feet of the belt "tailed out", or rolled back. Sixteen deg. was established as a safe maximum angle for the stacker boom conveyor, but in the interests of safety, provision has been made along the full length of the stacker belt to confine any large clusters that might roll back and bounce during a tail-out condition.

Materials and Design

The need for operating continuously at -45°F. created unusual problems in the selection of materials and of establishing their limits of design. The 275-ft. radius boom and the 90-ft. high mast of the stacker required the best possible strength-weight ratio. Axles, wheels, swing pinions and sheaves had to withstand their respective impact loads of travelling, starting and stopping as well as the design loads for a 100 m.p.h. wind.

After considerable investigation, Mayari-R steel was selected for chord members of the stacker boom and other highly stressed parts of the boom and mast. Less important structural members were made of standard rolled steel. Welding procedures were worked out with special care. Forgings of an alloy steel for which there was a substantial experience of testing at -40°F. were used for some of the more heavily loaded pinions, wheels and shafts. Other parts were made of A.I.S.I. 8735 or A.I.S.I. 1035,

depending on their loads and importance. Bearings used throughout the system are of the roller-bearing type with cast-steel housings. Despite the low temperatures, commercial lubricants are considered satisfactory for the shaft bearings, speed reducers and belt idlers.

The stacker is designed for stability in a 100 m.p.h. wind with the boom at maximum elevation. All parts are designed for full operation in a 68 m.p.h. wind. Initially, the anemometer controls will be set to sound a warning at 40 m.p.h., and to actuate a shutdown sequence at 50 m.p.h. Later, if desired, these controls may be set for higher velocities. Since the crest of the stockpile and the outer end of the stacker boom will be obscured from the operator in a heavy snowstorm, special provisions are made for operating "blind". A set of electric probes is suspended from the outer end of the boom, these being arranged to function in two stages according to the proximity of the pile. Ordinarily, when running "blind", the stacker operator will rotate the boom a suitable distance after each warning signal without interrupting the normal flow of pellets.

It is an understatement to say that there was no precedent for conveyor belt handling material at 250°F. and operating at -45°F. Not even test work had been done on belt carcasses and rubber compounds for this range of extreme temperatures. With the co-operation of several rubber companies, belts were selected that offer possibilities of reasonably good service. Procedures were set up to clear the system as part of the stopping sequence to protect the belts from prolonged baking action of the pellets if stopped under load.

Great care has been taken throughout the system to ensure continuous operation and to protect workers and equipment.

Taconite Harbour System

At the Taconite Harbour dock the conditions are quite different. The flow is simple, atmospheric temperatures are moderate, except at the beginning and end of the season, and pellets will be reasonably cool. There, the principal requirements of the system are: (1) to provide surge between rail and water transportation facilities; (2) to load pellets into lake vessels economically at a practical maximum rate; and (3) to weigh the pellets during the loading operation.

Surge capacity of about 100,000 gross tons will be contained in the track hopper forming part of the dock structure. The initial hopper and dock are 1,200 ft. long, but they may be extended to 1,800 ft. in the future. Trains from Hoyt Lakes will be run over a trestle above this hopper, and the pellets will be dumped from special drop-bottom cars.

The method of loading boats and the arrangement of the loading system are quite simple, but the magnitude of the operation created problems of control and communication beyond those ordinarily required in plants of this kind. The system consists of 25 42-in. wide shuttle belt conveyors beneath the track hopper spaced at 48 ft. centres. Each belt is fed by a double reciprocating feeder and is equipped with a weighing device. Conveyor speeds are 250 and 500 f.p.m.

The functions of feeding, conveying, advancing, retreating and weighing are controlled separately for each conveyor, but the controls for a bank of 12 conveyors are grouped in one operating cab and those for the remaining 13 conveyors in another cab. It is planned to operate one bank of conveyors for each vessel, so that it would be possible for one operator to load and trim up to 13 hatches simultaneously.

Coal Resources of the United Kingdom

IN the past ten years, drilling has been undertaken by the National Coal Board in all coalfields, generally in areas where it is reasonably certain that workable coal persists.

The aims have been to obtain samples of the seams for laboratory examinations; to collect information on the underground structure; and to note indications of the direction in which further exploration should proceed. Major drilling programmes have been carried out in the deeper parts of the Central Coalfield of Scotland, in the Mauchline Basin of Ayrshire and, more recently, in the undersea field below the Firth of Forth by off-shore drilling from a sea tower.

These programmes have made it possible to embark on large reconstruction schemes at Kinneil and Valleyfield collieries and to plan a new colliery at Airth to develop much-needed carbonization coals. The off-shore drilling has confirmed the structure of the fields to be exploited from the coastal collieries in Fife and the Lothians and enabled plans to be prepared for two new sinkings on the banks of the Firth of Forth. Further off-shore drilling is planned in the undersea fields of the Northumberland and Durham coalfields to establish the geological structure and thus enable satisfactory plans to be made for the development of the coastal collieries.

The eastward extension of the great East Pennines Coalfield is being explored ahead of the migration of collieries in that direction but already a large new colliery is planned for Kellingley, to the east of Pontefract, and there are indications that it might be possible to site another new colliery to the south of Selby.

Continuation of Coal Measures

The margins of the Cheshire Plain have been tested for the continuation of coal measures by drilling in North Wales and South Lancashire. This has allowed of the planning of a new colliery at Parkside to the north-east of Warrington.

In the large area of concealed coal measures surrounding the coalfields of the South Midlands, drilling has been concentrated in several of the more promising districts. This programme has made possible the reconstruction of a number of collieries in North Staffordshire, a new sinking at Lea Hall, near Rugeley, in South Staffordshire, and the planning of a new colliery west of Ashby-de-la-Zouch in the South Derbyshire Coalfield. In South Wales, exploration in the north-west of the coalfield have resulted in the new sinkings at Cynheidre and Abernant, whilst similar exploration in the south-west has made it possible to consider a new sinking to the south-east of Port Talbot for the production of valuable coking coals.

From the results of this large drilling programme by the Board, aided by examination and interpretation by the Geological Survey, enough information has been collected and assimilated to allow of the construction of fifteen new collieries in virgin areas, as well as to make possible the reconstruction of some 200 existing collieries. The reserves to be worked as a result of these developments amount to over 4,000,000,000 tons. In addition, the approximate sites of eleven more new collieries have been fixed.

The original programme of drilling, which was designed to enable the Board to embark on the National Plan published in 1950, has been completed in its broad

The Parliamentary and Scientific Committee, which comprises peers, M.P.s, and the heads of most of the main industries, and meets periodically in private session for addresses from experts on all manner of industrial affairs, had one session on the Geological Survey, which included a paper by Mr. H. E. Collins, C.B.E., of the National Coal Board, on coal resources. The most important part of the address, published herewith, was on the migration of collieries and the latest developments in opening new pits. The session was opened by Sir William Pugh, Director, Geological Survey and Museum.

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essentials, though further drilling will be required in connection with individual colliery projects and will continue until about 1965. There is still much to be learned, however, about some of the concealed extensions of U.K. coalfields and there might even be new coalfields to discover. Therefore the search for new information must go on. A new programme of drilling is in fact now under consideration to provide guidance for further development.

New Programme of Development

It will be obvious that the vast programme of development of new collieries and the reconstruction of existing collieries would have been impossible or, to say the least, far too speculative, without adequate geological appraisals of the fields involved. The latter has only been possible by the valuable assistance rendered to the Board by the Geological Survey. At Vesting Date, it was agreed between the National Coal Board and the Director of the Geological Survey and Museum that the Survey would place at the disposal of the Board the services of their officers in the field and in the laboratory, and in return the Board would give survey officers access to all information likely to help in advancing our knowledge of Britain's coalfields.

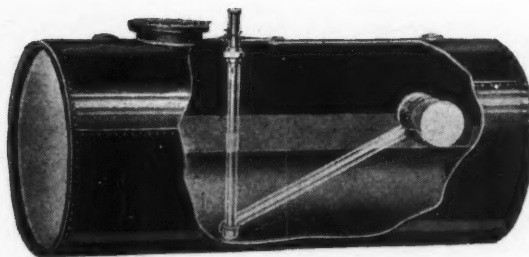
The fact that this agreement has borne abundant fruit has already been demonstrated. In addition to the provision of information indicating the occurrence of resources and their associated structure, new light has been thrown on the studies of sedimentation and particularly on the changes in sedimentation that mark geological events. The zoning of coal measures by plant and animal remains has now reached a stage where groups of seams, and even individual seams, can be correlated not only from district to district, but from one coalfield to another.

Continental Transport System

Elsewhere in his paper, Mr. Collins pointed out that it was now considered necessary to adopt the Continental system of horizon mining, where the transport systems are located in level roadways driven in the coal-bearing strata, and so facilitating the use of the more efficient locomotive haulage. The capital required for a modern colliery far exceeded the pre-war figure, and is now in the order of £10 to £12 per ton of annual output.

Machinery and Equipment

Eliminating Dirt in Pump Suction Lines



Cut-away view of a storage tank fitted with the Bowser Figure 280 Floating Suction

The Bowser Figure 280 Floating Suction now being manufactured under licence by Liquid Systems Ltd., is designed for use in fuelling systems and numerous industrial applications where it is necessary or desirable to draw clear liquid from the surface instead of from the bottom of the storage tank. Its use eliminates much of the trouble caused from the drawing of water or dirt into pump suction lines.

The simple construction and operation of the Figure 280 permits the float to lower as the liquid level falls and to rise when the tank supply is replenished. Installation may be made easily in either above ground or underground tanks equipped with a manhole to provide access for installing. The equipment can be visualized as finding application in the mining industry.

The Figure 280 consists of the float, inlet flange, float clamp, swing elbows and nipples. It is available in five standard pipe lengths; 1½ in., 1¾ in., 2 in. and 4 in. The unit is galvanized M.S. welded with inlet flanged cast iron.

THERMOCOUPLE-CALIBRATING FURNACE

Johnson, Matthey and Co. Ltd., are producing an entirely new design of thermocouple-calibrating furnace. Known as the type TK. 2, this furnace fulfils the broad requirements laid down in the D.S.I.R. Report *The Technique of Calibrating Platinum Thermocouples for Use in Liquid Steel*, dated August, 1942.

It permits the calibration of platinum: rhodium-platinum thermocouples by the determination of their e.m.f.'s at the gold, palladium and platinum points.

The furnace, the combustion chamber of which is 12 in. long and ½ in. in dia., is wound with 40 per cent rhodium-platinum wire, this element being designed for operation at 100 volts. Two layers of insulating material are used between the element and the casing in order to keep thermal losses to a minimum and to counter the effects of draught and changes in ambient temperature. The furnace has a maximum operating temperature of 1,775 deg. C.

The casing is stove-enamelled and has cast light alloys end covers. The furnace stands on a substantial cast tripod that is bolted to the bottom end cover. Two thermocouples may be calibrated together, these being inserted from the top of the furnace. If required, a control couple can be inserted from the bottom of the furnace.

COAL PREPARATION PLANT

Head Wrightson Colliery Engineering Ltd., a subsidiary of Head Wrightson & Co. Ltd., were responsible for the design and construction of the Manvers Main central coal preparation plant at Wath-on-Dearne in the North Eastern Division, N.C.B., which recently reached full production. Manvers Main, the largest plant of its kind in Europe, has a nominal capacity of 1,320 tons per hour and was built to treat the output of the

Manvers combined mine, a re-organization scheme which co-ordinated the working of four collieries, with Manvers Main Colliery as the central point.

This central coal preparation plant consists of three almost identical units side by side, each having a capacity of 440 tons per hour. Separate conveyors bring coal from Manvers No.'s 2 and 3 Pits to the washery, which is also supplied with coal from Barnburgh Colliery through a wagon tippler. The plant is so arranged that raw coal from any of the three sources can be fed to any of the three units as required.

The treatment in each unit comprises dense medium washing for the 8 in.—2 in. fraction, the medium used being prepared from flotation tailings; Baum jig washing for the 2 in.—0 fraction; and froth flotation for the ½ mm.—0 fines.

NEW RHODESIAN DUMPER

A Rhodesian engineering company has developed and designed a dumper which not only meets the requirements of Rhodesian workers, but is also in demand in Europe and America. The dumper can be drawn by any 40-h.p. tractor and has a pay-load of 6½ tons, although it has carried 9½ tons.

The dumper involves a new principle in linkage which enables the heavy loads to be carried without upsetting the tractor. So impressed are overseas countries with the dumper that the managing director of the company concerned is coming to Europe to complete arrangements for the establishment of three factories in Europe and two more in America to manufacture under licence.

The Manvers Main coal preparation plant designed and constructed by Head Wrightson Colliery Engineering Ltd.



MINING MISCELLANY

The discovery of copper, tin and manganese in the Sudan has been officially announced.

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Sixteen prospecting licences have been applied for by Aluminium Laboratories Ltd. in Fiji covering about 400 sq. miles.

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Rich zinc and lead ore deposits have been discovered in the Bledow and Starczynow districts, Katowice voivodship, Poland, at a depth of 45-65 ft. The seams at Starczynow are reported to be several yards thick.

★

The Rhodesian Railways recently entered into an agreement to hire an additional £2,500,000 worth of trucks. This decision follows an agreement made in 1955 whereby the Anglo American Development Corporation lent the railways £5,000,000 worth of railway stock.

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Consolidated African Selection Trust is to spend £32,000 during the next three years in a search for diamonds in Southern Rhodesia. The company has taken out a three-year exclusive prospecting order covering 91 sq. miles at Somabula. Nearly 16,000 ct. of diamonds have been found in this area, valued at £76,000.

★

In Holland, a demand has been rejected for an extra bonus of 1.5 guilders per day for underground miners and of 1.0 guilders per day for pithead workers and other staff. It is believed that the Catholic Miners' Union (30,000 members) is planning action in September to enforce this demand, but the Socialist Miners' Union (2,000 members) is remaining aloof.

Canadian airborne surveyors are carrying out a magnetometric survey of Southern England. The equipment includes a continuous 35 mm. strip camera and a Decca Navigator Mk. 8 receiver, used in conjunction with the Gulf Research and Development Model III magnetometer. The survey forms part of a programme of regional geological and geophysical investigation conducted by the Geological Survey of Great Britain, a research establishment of the Department of Scientific and Industrial Research. The Canadian surveyors are members of Canadian Aero Service Limited, part of the Canadian Aero-Spartan group of Ottawa, Canada. The flying phase of the programme began on June 15, 1957, and was expected to be completed by the middle of August. The Canadian Aero-Spartan group have now completed nearly a million miles of airborne magnetometer surveys throughout the world. This is its second survey in Great Britain, for it has flown approximately 15,000 miles for the Geological Survey in 1955, this project being financed by the Nuffield Foundation.

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Special privileges have been granted to the mining industry in Colombia by decree. All base minerals may henceforth be exported freely without paying export taxes and without any obligation to return to the country any of the dollars earned from exports. Such dollars, may, however, be sold on the free market. This regulation has been issued for a period of 30 years and puts the mining industry on an equal footing with the petroleum industry. It mainly affects cement, coal, and sulphur at the present time, but in the future, it may help to develop other mineral deposits. A special

statute will be worked out for the precious metal industry. All gold, silver and platinum will, in future, be sold to the Banco de la Republica, which will thus become the sole exporter. Banco de la Republica will pay the miners in dollars. Other details of the arrangements are not yet known.

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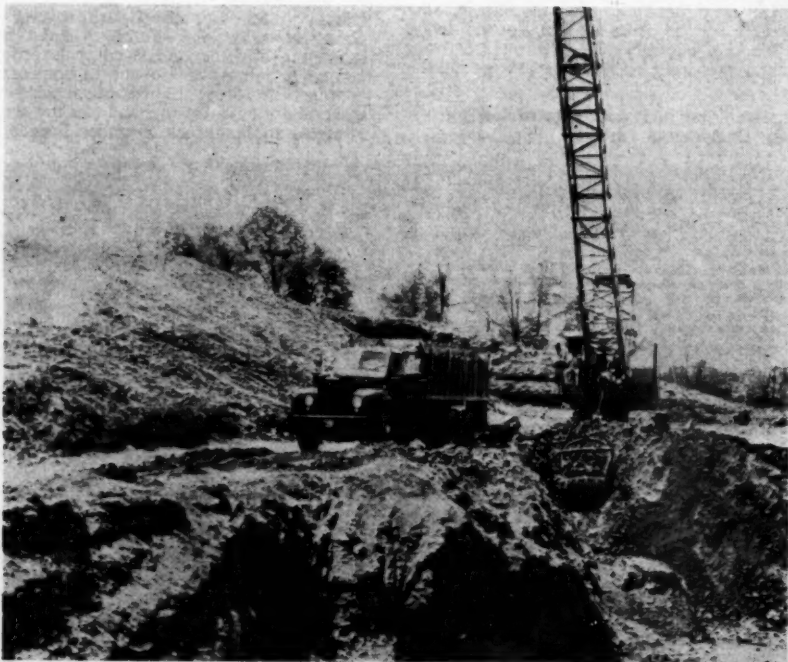
During the last three years a development has taken place in more efficient hold trimming and obviating the old method of hand-trimming and Merton Overloaders are now being used for this work in 15 of the major West European and Baltic ports. These machines, which dig at the front and unload at the rear, are used to bring cargo from the wings of the holds to the centre enabling the dockside grabs to unload more quickly and efficiently thereby obviating all hand-labour. They have been successful in handling iron ore and anthracite.

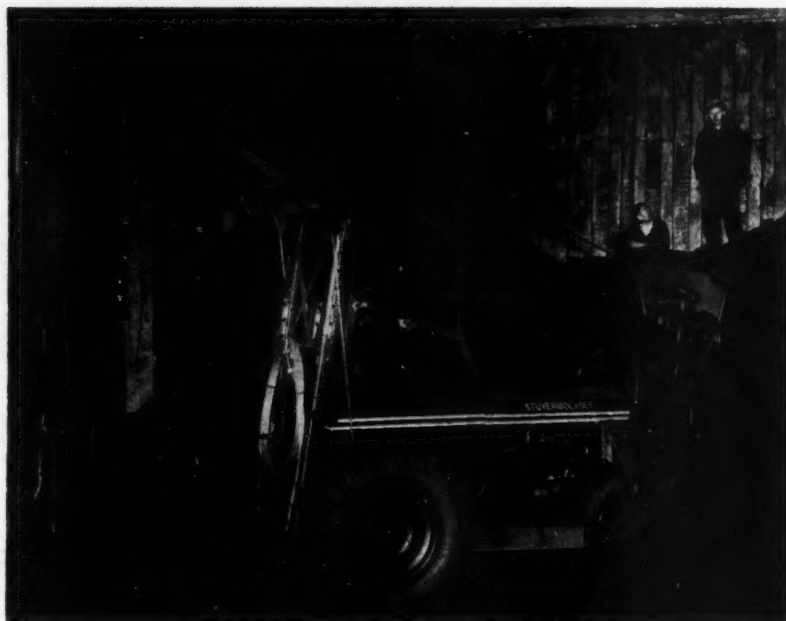


The use of a combined dragline and tractor method for stripping overburden from phosphate deposits lying 60 ft. below the surface of a hillside contour deposit, results in a top production of 1,500 tons of material per day for a mine in Tennessee, United States. Two large tractor-bulldozer units used as a team cut about two-thirds of the clay and broken flint overburden away, pushing it down the hillside. The remaining cover is removed by a dragline which strips a pit around a hill approximately 100 ft. wide from which the phosphate matrix is removed by small dragline loading tandem trucks. Operation is a continuous process, the bulldozers starting a new pit up the hill, as the material is removed from the lower pit.

Above: Two Cat D9 tractors push a load of overburden in Tennessee phosphate operation

Below: A Cat D1 3000-powered Koehring 605 1½ yd. dragline loads truck with lower grade ore





Merton Overloader trimming anthracite in Gothenburg

PERSONAL

Mr. G. Keith Allen, B.M.E., has been elected president of the London Institution of Mining and Metallurgy for the session 1957-1958.

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Mr. S. D. Michaelson, chief engineer of the Western Mining Divisions, Kennecott Copper Corporation, Salt Lake City, Utah, has been named president-elect of the Society of Mining Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers. He will take office as head of this largest group of AIME in February of 1958.

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Mr. R. W. H. Bruce is giving up his position as principal representative for the Rio Tinto group in Africa in November, 1957. He will not sever his connection with the group. Mr. M. A. W. Rowlandson will take over from Mr. Bruce.

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Mr. A. R. Neelands, chairman of The Cementation Co. Ltd., left for Canada on August 16 to visit the company's various offices and contracts. Mr. Neelands will attend the Sixth Commonwealth Mining and Metallurgical Congress.

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Mr. C. S. Goddard, F.C.A., has been appointed a director of Nigel Van Ryn Reefs Ltd.

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Mr. L. Webster has been appointed production manager (engineering) of Distington Engineering Co. Ltd., a subsidiary of the United Steel Companies Ltd.

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Mr. W. A. Dry, secretary of the Westminster Bank Ltd., will retire on September 6, 1957, after 47 years of service. Mr. L. R. Murray will succeed him as secretary.

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Copper Pass awards in respect of papers published in *Transactions* of the Institution of Mining and Metallurgy and the *Journal* of the Institute of Metals

for 1956 have been made to the following: Drs. J. M. Fletcher and D. F. C. Morris and Mr. A. G. Wain for the paper, "Outline of a Solvent Extraction Process for the Purification of Niobium from Ores or from Ferro-Niobium". Mr. J. A. Grainger, "The Deep Drawing and Spinning of Sheet Metal, with Particular Reference to Non-Ferrous Materials", and Mr. J. Fielding for his paper, "Rubber Pressing".

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Dawson and Forbes of 21-24 Bury Street, St. James's, London, S.W., have been appointed secretaries and registrars of the Paringa Mining and Exploration Co. The transfer and registered offices of the company are now at this address.

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Subject to confirmation by stockholders, the name of British Tyre and Rubber Co. Ltd. will be changed to B.T.R. Industries Ltd. as from September 16, 1957. The B.T.R. trademark will continue to identify the company's products.

CONTRACTS AND TENDERS

The following future procurements have been announced by the International Co-operation Administration.

Ceylon

Portable crushing and screening plant for 80-130 tons (2,000 lb. per ton) per hr. 1 in. stone and under. Storage and loading bin all-steel capacity 35 tons. Adjustable height and slope channel frame power driven belt, portable conveyor 24 in. wide 30 ft. long. Issuing authority Ministry of Transport and Works, P.O. Box 547, Colombo. Closing date September 25, 1957. Ref.: E.S.B./19205/57. Telephone: Chancery 4411, extension 354.

Australia

Feeding, crushing, screening, conveying, storage bins and all associated equipment to produce crushed metal. Bids to Commissioner for Railways, Brisbane. Closing date January 16, 1958. Ref.: E.S.B./19018/57. Telephone: Chancery 4411, extensions 738 or 771.

Vietnam

900 lb. calcium hypochlorite, 20 tons gel-forming colloidal bentonite drilling clay, 21,800 ft. 6 in. steel drive pipe threaded and coupled, machine bolts, steel tapes, safety helmets, bushings and force pumps. Issuing Authority, Central Purchasing Agency, P.O. Box 280, Saigon, Vietnam. Closing date September 4, 1957. Ref.: E.S.B./19481/57. Telephone: Chancery 4411, extension 354.

Portuguese East Africa

Steel wire ropes for cranes. Issuing authority, Ports, Railways and Transport Department, Beira. Closing date September 3, 1957. Ref.: E.S.B./19295/57. Telephone: Chancery 4411, extension 738 or 771.

South Africa

Circular Gen/3557 of July 2, 1957 re. tests by S. A. railways of tungsten carbide tips. Closing date of tests now September 6, 1957. Ref.: E.S.B./15874/57. Telephone: Chancery 4411, extension 738 or 771.

South Africa

Air compressors, various specifications. S.A. Railways. Closing date September 6, 1957. Ref.: E.S.B./19057/57. Telephone: Chancery 4411, extension 738 or 771.

Taiwan

Electrical machinery and apparatus. Various types and specifications. Central Trust of China. Closing date September 2, 1957. Ref.: E.S.B./18957/57. Telephone: Chancery 4411, extension 354.

South Africa

Coal, dust and ash handling plant. City Electrical Engineer, Strand Street, Cape Town. Closing dates October 15, 1957, and November 1, 1957. Ref.: E.S.B./19017/57. Telephone: Chancery 4411, extension 738 or 771.

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The Dryer Division of Birlec Ltd., who recently announced that they have been commissioned to supply drying plant to two of the three atomic power stations in Britain, have now received an order in connection with the third, which is to be built by the Nuclear Power Plant Co. Ltd. at Bradwell, Essex. The application will be the same in all three stations, namely for extracting water vapour from the carbon dioxide gas employed in the transfer of heat from the nuclear reactor to the heat exchanger. Further atomic energy contracts recently placed with the Dryer Division of Birlec include two for drying plant destined for the United Kingdom Atomic Energy Establishments at Harwell and Aldermaston. In both instances the dryers are to be used in connection with Van de Graaf generators, which are electrostatic devices for developing electric potentials of the order of several million volts.

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An order worth £3,000,000 for 55 electric locomotives, Class 5, has been placed by South African Railways with the English Electric Co. of South Africa, Pty. Ltd. The total number of new electric locomotives which is being ordered for the electrification of the railways is 190. The first order for 135 was placed with Metropolitan Vickers of South Africa, Pty. Ltd., at a cost of £7,500,000.

Metals and Minerals

Free Nickel Market Unsettled

The downward drift in nickel prices—it has been a feature of the market for some time now—appears to have gained momentum. Dealers' ideas continue to vary somewhat, but in the main they point to a price range for the metal outside the U.K. from £1,200 to £1,450 per ton. Pure nickel scrap is put at from £1,000 to £1,200 per ton. In the U.K., the free metal price is indicated at from £1,050 to £1,200 per ton and scrap at from £650 to £800. Towards the end of last year, the free metal price outside the U.K. was quoted at up to £2,400 per ton and the U.K. at up to £1,600. The fixed price to U.K. consumers was raised from £519 to £600 per ton on December 6 last.

The recent Board of Trade announcement of their intention to release 1,600 tons of nickel pellets from the strategic stockpile over the nine-month period beginning next month has been an additional factor in depressing values. The amount of metal involved is not large, probably not representing more than a month's U.K. consumption, but it has hit the market at a time when demand is not particularly active and, further, references made by spokesmen of International Nickel of supplies catching up with demand quicker than anticipated have also had their effect.

Some market quarters hint at the strong possibility that by the end of this year, U.K. scrap prices could be below the fixed metal price of £600 per ton.

The New China News Agency reports that workable deposits of nickel ore—rare in China—have been discovered in Hweili County in the Szechwan Province of South West China.

NEW MANGANESE PLANT FOR CANADA

Strategic Minerals Corporation is planning to build a plant in Woodstock, New Brunswick, Canada, for the production of 70,000 tons of ferromanganese and 77,000 tons of ingot iron annually.

The president in his annual review to members also stated that the company is at present considering methods of financing this project and is collecting data for the design of the plant. He disclosed that Strategic had given precedence at its new electric furnace prototype plant at Niagara Falls, Ontario, to the testing of manganiferous ores from the holdings of its subsidiary, Strategic Manganese Corporation. The bulk tests, which were still in progress, had shown the economics of the company's process to be favourable.

Strategic Minerals had transferred property containing some 150,000,000 tons of manganese ore in the "proven, probable and possible" classes to Strategic Manganese Corporation.

From Tokyo comes the report that five leading Japanese ferromanganese

concerns—Nippon Kokan, Azuma Kako, Tekko-sha, Nippon Denki-Yakin and Nippon Denko—are trying to fix up pricing arrangements to improve export prices of their products "by removing unnecessary competition among them".

The industry is making every effort to cope with the current recession in the domestic market and one ferro-alloy maker has stated that the arrangement is being made to prevent individual companies from making indiscriminate price cuts in order to attract overseas buyers.

He said floor prices for exports of ferromanganese tentatively fixed by the companies were U.S.\$220 per tonne f.o.b. Japan for No. 2 high-carbon ferromanganese; \$180 for silicon manganese containing 1.5 per cent carbon; \$175 for silicon manganese containing 2 per cent carbon and \$330 for medium-carbon ferromanganese.

CHROME ORE MARKET UNEVENTFUL

The chrome ore market in London has pursued a generally uneventful course during the past few weeks, according to trade quarters. The volume of fresh trade demand remains unimpressive, although good refractory material is reported to be marketable without much difficulty, provided the price is not too far out of line with buyers' ideas. Metallurgical ore is said to be quite readily available. A factor in the present situation is the reduced demand from Japan, which, trade quarters declare, has possibly played a part in exerting restraint on market sentiment.

The broad market pattern still seems to be one of buyers being reasonably well covered for the moment. The major suppliers, with a good part of their production under contract, are presumably in a much stronger position to maintain prices. But some price shading sometimes emanates from the smaller suppliers, trade quarters say. For instance, for the generally quoted Turkish prices for 48 per cent metallurgical material (3 to 1 ratio) at \$58 per s.ton and 46 per cent metallurgical (3 to 1) at \$54 per s.ton c.i.f., lower prices are sometimes seen.

Present conditions may persist for a while yet. With the holidays over, some broadening in demand would not be unexpected as buyers look to their future requirements.

G.S.A. ALUMINIUM AGREEMENT

The General Services Administration of the U.S. Government has worked out a tentative agreement with leading aluminium producers, whereby these companies will limit their sale of excessive domestic output to the government so long as they continue to import the metal from Canada.

A plan originated during the Korean War with the object of stimulating production of aluminium gave Alcoa, Kaiser

and Reynolds the right to require the U.S. Government to buy aluminium from new plants that would be built, should they be unable to dispose of the metal at satisfactory prices through regular commercial channels. Last December the three companies began exercising their rights and they have so far tendered 292,750 s.tons at a cost of about \$146,000,000.

The House-Senate Defence Production Committee is concerned about the effect on this purchase programme of a long-term contract signed in 1953, which provides for Alcan to supply Alcoa and Kaiser with up to 750,000 tons of metal. The chairman of this committee claims that the two companies could sell all their imports in the domestic market and still call on the government to take surplus production from their new domestic plants. All told, the three companies could make the government buy up to 900,000 tons of their excess production until contracts run out in mid-1959. At current market prices this would cost about \$450,000,000.

Under the new tentative agreements with Alcoa and Kaiser, these companies would deduct respectively 80 per cent and 75 per cent of their Canadian imports from the total amount of aluminium tendered to the government. This will result in a total deduction of as much as \$75,000,000 in the quantity of domestic aluminium which the government might be called upon to buy over the next two years.

Olin Mathieson Chemical Corporation is to open up seven new sales offices across the United States to be integrated into a nation-wide sales organization on the eve of the firm's entry into large-scale aluminium production next year.

While Olin is currently fabricating aluminium items at four plants, the starting up of production in 1958 at a large fabrication plant now under construction in the Ohio River valley will put the company among the "big four" in aluminium fabrication. Primary aluminium will be produced nearby by Ormet Corporation, owned jointly by Olin and Revere Copper and Brass Corporation. Of Ormet's 180,000 tons annual output, Olin will receive 120,000 tons.

Start of construction of the aluminium plant, which Yugoslavia is to build in Montenegro with the help of the Soviet Union and East Germany, is scheduled for 1958. By 1961 output will be about 50,000 tons annually. Capacity operation (100,000) tons will be reached in 1964. The agreement on the aluminium smelter and other plants was initially signed in August last year.

An American concern is reported to be studying the question of building a plant for the production of aluminium ingots from imported bauxite at Cartagena, Colombia.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The market this week has been largely influenced by currency considerations although political developments in Syria played their part in the initial firmness and in reducing the fall on the announcement that the U.K. Government was going to sell another 27,000 tons of copper from October at a monthly rate not exceeding 2,700 tons. In general, demand for copper has been disappointing whilst that for the other three metals has shown improvement.

UNCERTAIN COPPER OUTLOOK

The period under review started with buying on devaluation fears and ended with weakness following upon the announcement of the U.K. Government's sale and the denials from both Germany and the U.K. that any alteration in the exchange rates was contemplated. The contango has narrowed on technical considerations in spite of an increase in stocks on Monday of about 200 tons.

Demand in this country has remained satisfactory for the time of year and it is interesting to note from the last available figures that the off-take of copper during the first half of this year amounted to 331,247 tons against a total of 633,052 tons for the whole of last year. Stocks of refined and blister copper at the end of June showed only a slight increase over that at the end of May at 64,121 tons.

The outlook for the next few months as far as the L.M.E. price is concerned is still very doubtful but with consumption on this side of the Atlantic remaining at a level comparable with that of last year, the crux of the situation lies in the development or otherwise of buying in the U.S. It is understood that great store is being laid upon the increase in automobile sales with the introduction of the new models. If business revives across the Atlantic we shall probably see prices moving up steadily for a few weeks. If, however, business activity in the States does not increase, then many quarters consider that the price of copper may have to go down as far as £180 per ton before producers take the necessary action to reverse the trend.

Meanwhile, a leading custom smelter cut its price by $\frac{1}{2}$ c. to 27 $\frac{1}{2}$ c. per lb. on Wednesday. Weakness of the London price, the U.K. Government's release of copper from its stockpile, and a low price offer to meet U.S. mint buying, are the prime factors offered in explanation for this decision.

U.S. primary producers are maintaining their price at 28 $\frac{1}{2}$ c. per lb.

TIN CONTANGO MAINTAINED

Demand for tin remains good and price fluctuations have been only of a minor nature with the contango becoming

more established. The stocks in official warehouses again showed an increase of over 200 tons and it is felt that in spite of metal taken over by the Buffer Stock there is a sufficiently large free tonnage to maintain the market in a fluid condition.

Tin consumption in the U.K. in June amounted to 1,799 tons against 2,240 tons in May and stocks at the end of the month showed an increase of about 650 tons at 4,692 tons. On Thursday morning the Eastern price was equivalent to £752 $\frac{1}{2}$ per ton c.i.f. Europe.

FIRMER LEAD AND ZINC

The lead and zinc markets have both been somewhat firmer in spite of news from America about the possible imposition of additional import duties. It is understood that the latest proposal of a 3 c. per lb. duty on both metals has been rejected and that the only possible change can be the introduction of the sliding scale tariffs mentioned in a previous article: it is, however, deemed unlikely that any action will be taken before the Congress goes on holiday before the end of this month.

Buying has taken place from those quarters who consider that if there was a duty increase, then there would be a certain time lapse before it came into effect and it would, therefore, be possible to buy metal now and rush it into the States at the lower rate of duty. Others, however, feel that this is a wrong theory and that any increase in duty in the U.S. will result initially in lower prices on this side.

The latest figures show that the off-take of lead during the first six months of this year in the U.K. amounted to 177,156 tons against a total for the whole of last year of 357,694, with stocks of refined lead at the end of June totalling 42,148, which was only slightly above the figure for the end of May. For June, the off-take for the six months was 161,623 against the figure for the whole of last year of 318,511. Stocks at the end of June totalled 37,384 tons which was only slightly higher than the figure for the previous month.

In America the production of lead during June was the lowest figure since November, 1955, at 26,400 tons, which was some 11 per cent lower than the May figure. For zinc, the output showed a decline of 2 per cent at 45,000 tons in June.

Closing prices and turnovers are:

THE WEEK ON THE L.M.E.

	Aug. 15		Aug. 22	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£213 $\frac{1}{2}$	£213 $\frac{1}{2}$	£209 $\frac{1}{2}$	£210
Three months ..	£215	£215 $\frac{1}{2}$	£209 $\frac{1}{2}$	£209 $\frac{1}{2}$
Settlement ..		£213 $\frac{1}{2}$		£210
Week's turnover ..	4,900 tons		7,325 tons	
LEAD				
Current $\frac{1}{2}$ month ..	£93 $\frac{1}{2}$	£93 $\frac{1}{2}$	£92 $\frac{1}{2}$	£93
Three months ..	£93 $\frac{1}{2}$	£93 $\frac{1}{2}$	£92 $\frac{1}{2}$	£93
Week's turnover ..	4,375 tons		4,950 tons	
TIN				
Cash	£745 $\frac{1}{2}$	£746	£740 $\frac{1}{2}$	£741
Three months ..	£745 $\frac{1}{2}$	£746	£742 $\frac{1}{2}$	£743
Settlement ..		£746		£741
Week's turnover ..	780 tons		770 tons	
ZINC				
Current $\frac{1}{2}$ month ..	£75 $\frac{1}{2}$	£75 $\frac{1}{2}$	£74 $\frac{1}{2}$	£74 $\frac{1}{2}$
Three months ..	£75	£75 $\frac{1}{2}$	£74 $\frac{1}{2}$	£74 $\frac{1}{2}$
Week's turnover ..	5,900 tons		4,975 tons	

LONDON METAL AND ORE PRICES, AUGUST 22, 1957

METAL PRICES

Aluminium, 99.5%, £197 per ton
Antimony —
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 21s. 0d./22s. 0d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Cerium (99% net), £13 18s. lb. delivered U.K.
Chromium, Cr. 99% 7s. 2d. lb.
Cobalt, 16s.-19s. lb.
Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram
Gold, 251s. 3d.

Iridium, £27/29 oz. nom.
Lanthanum (98/99%) 15s. per gram
Manganese Metal (96%-98%) £310
Magnesium, 2s. 5 $\frac{1}{2}$ d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £20/22 oz. nom.
Osmidium, nom.
Palladium, £7 10s./£8 0s. oz.
Platinum U.K. and Empire Refined £31/£34 oz.
Imported £28 10s./£29 10s. nom.
Quicksilver, £85/£87 ex-warehouse
Rhodium, £42 oz.
Ruthenium, £15/£17 oz. nom.
Selenium, 75s. nom. per lb.
Silver, 78 $\frac{1}{2}$ d. f. oz. spot and 78 $\frac{1}{2}$ d. f.d.
Tellurium, 15s. 16s. lb.

ORES AND OXIDES

Bismuth 65% 8s. 6d. lb. c.i.f.
18-20% 1s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (semifabril) 48% £19 5s. 0d. per ton c.i.f.
" Hard Lumpy (45%) £19 5s. 0d. per ton c.i.f.
" Refractory 40% £13 0s. 0d. per ton c.i.f.
" Smalls 44% £18 0s. 0d. per ton c.i.f.
Baluchistan 48% £12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade 185s./197s. 6d. per unit
Fluorspar—
Acid Grade, Flotated Material £22 13s. 3d. per ton ex. works
Metallurgical (75/80% Ca F₂) 156s. 0d. ex works
Lithium Ore—
Petalite min. 34% Li₂O 47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li₂O 47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li₂O £26 5s. per ton f.o.b. Beira
Magnesite, ground calcined £28 0s./£30 0s. d/d
Magnesite Raw (ground) £21 0s./£22 0s. d/d
Molybdenite (85% basis) 8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore—
Rutile 95/97% TiO₂ (prompt delivery) £49/£52 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO₂ £11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) 110s. 0d./115s. 0d. per unit c.i.f.
Manganese Ore Indian 131d./133d. per unit c.i.f.
Europe (46%-48%) basis 130s. freight plus 5% surcharge 106d./108d. per unit c.i.f.
Manganese Ore (43%-45%) 100d./102d. per unit
Manganese Ore (38%-40%) (including duty)
Vanadium—
Fused oxide 90-95% V₂O₅ £12s-£13 $\frac{1}{2}$ per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO₂) £19 per ton c.i.f.

Mining Finance

Charity Ought to Begin at Home

Mr. G. W. Simms, chairman of Geevor Tin Mines, in his annual review to members has taken the opportunity to draw attention to the anomalous position of the United Kingdom metal mining industry.

After pointing out that however fully the two remaining tin producers in this country carry out their obligations to the Cornish tin industry, such action could not in itself lead to a revival of the industry. To achieve that end, it is essential, Mr. Simms states, that the government should also play its part and recognize its obligation in this matter.

The solution, he declares, is not difficult as all that is required is for the government to recognize the penal nature of the present mine taxation in the United Kingdom and bring it more into line with that of countries such as Canada, Australia and the U.S.A. who fully realize that mine taxation operates on a wasting asset, and accordingly make more adequate provision for that fact.

Those countries have proved that it pays to encourage their domestic mining industries in that manner and it, therefore, seems odd to Mr. Simms that the U.K. Government, which is in the process of recognizing the need for fostering overseas mining operations by the removal of taxation on mining companies registered here but operating abroad, has so far refused to recognize the equally great need of fostering and developing its own metal mining industry by taking the necessary action with regard to mine taxation.

This all the more surprising in that doing so both the U.K. Treasury and the country stand to lose little but would undoubtedly gain a great deal.

THE LEAD BONUS IN AUSTRALIA

The fall in the price of lead is causing discussion as to the immediate outlook for lead mines in Australia, writes our correspondent from Melbourne. All producers are saddled with the lead bonus to employees, which, fortunately, falls with the market price of metal, but is, nevertheless, a heavy addition to costs under present conditions.

On the Broken Hill mines the bonus paid in July fell by £1 17s. 6d. per week to £11 15s. for a full week worked, or £2 7s. per shift. Even at this decreased rate of payment, the lowest paid men on the field will receive a wage of £A25 16s. 6d. per week. To compensate the fall in earnings it is not unlikely that contract workers may increase their output of ore.

The position will doubtless, be felt most severely by Lake George Mines which are less able than mines on other fields to face the fall in metal prices. Mount Isa Mines may be expected to feel the new market conditions, for the grade of the ore in lead and silver is low, and transport facilities are unfavourable to moving increased tonnages of metal or concentrates, even if the

market is able to take greater than normal quantities. In the past financial year, the Broken Hill mines maintained their previous standard of production, but it may be expected that the cost position on all mines will be closely examined and economies effected.

There are few small lead mines in Australia; one, Protheroe lead mine, in Western Australia, worked by Anglo-Australian Mining Pty. Ltd., has already ceased work and the future of another property being prospected is uncertain. Tasmania has two small producers of lead, silver and zinc. Apart from the influence of metal prices on actual production, is the effect on the exploratory and prospecting work of the large organizations in parts of Australia remote from the mines themselves, which work is invaluable in testing the mineral potentialities of new, as well as little explored regions in the metalliferous localities.

NORTH RANKIN'S PROGRESS

Canada's most northerly nickel producer, North Rankin Nickel Mines, has announced good progress since the mine entered full production on June 1.

An operating profit of more than \$300,000 was made from 1,691 tons of concentrate produced in the period June 1 to July 25, and when additional equipment—now on its way to the mine—has been installed, mill output will be raised to the point of maximum efficiency.

The company has already sold in advance its entire anticipated production for 1957, of over 6,000 tons and sufficient ore has been outlined to ensure five years continuous milling. In addition, preparations are being made to explore ore extensions by surface drilling and to investigate newly staked ground some 30 miles south of North Rankin's property, situated about 350 miles north of Churchill on Hudson Bay.

LONDON MARKET HIGHLIGHTS

During the week to August 21, Kaffirs again dominated the mining share markets. The advance in prices that had started after the partial devaluation of the franc was carried on almost without pause. Even the reassuring Treasury statement on sterling, which caused a turnaround in commodity prices, failed to halt the rise in gold shares. Although nobody in the gold share market ever really believed that a devaluation of sterling was imminent, there were still hopes that the weakness of most European currencies, coupled with the flight of gold to Western Germany, might result in a higher gold price in some form after next month's International Monetary Fund meeting.

The later stages of the advance saw French buyers actively operating via London and the Cape. Sterling supply difficulties on the part of these operators were largely overcome by selling other stocks to reinvest in Kaffirs. The current weakness of Canadian dollar stocks can be attributed partially to this activity. Present steps taken to steady the franc have probably been considered to be only a stopgap until the I.M.F. meeting after which sterner measures may be expected.

In the circumstances it was no surprise that shares of the established gold producers and "Paris favourites" were well to the fore. Among them, substantial gains have been scored by Crown (24s. 9d.), Durban Deep (26s. 9d.), Randfontein (34s. 6d.) and East Geduld (28s.).

O.F.S. issues, while firm, have not been outstanding. Even so, President Brand (56s. 9d.), Offits (58s.) and Western Holdings (78s.) have moved ahead. Free State Geduld have altered little, but there has been some demand for Fred-

dies Consolidated (4s. 9d.) and Loraine (5s.); both these mines with long lives and large reserves of marginal gold ore would be prime beneficiaries from a higher gold price. Far West Rand issues have made a good showing with Stilfontein—another "Paris favourite"—(35s.) prominent.

Finance house shares have been popular, but Union Corporation (42s.) strangely, have lagged behind.

Copper shares have been fairly steady, though unhelpt by the rather inexplicable decision of the Board of Trade to announce a further release of stocks when copper is at a four-year low. Despite the comparative steadiness of copper share prices, the Rhodesian Selection Trust Group's June quarterly reports, expected soon, can hardly make encouraging reading. This being so, holders of Rhodesian copper shares may well consider selling part of their investment now with the object of reinvesting lower down.

Elsewhere, Australian and West African gold shares have hardened slightly in the wake of Kaffirs, Ashanti improving to 24s. Tin share prices have altered little, the doubled dividend and high yield considerations having small effect on Rantau (6s. 3d.). In an otherwise quiet lead-zinc section, Consolidated Zinc have eased further to 78s. 9d.; the less rosy short-term outlook for aluminium has possibly been considered in the light of Consolidated's huge bauxite commitments.

In diamonds, the weakness of Wall Street has been the dominating influence and De Beers have fallen back to 103s. 9d. Platinum shares have failed to show any real improvement after their recent setback.

FINANCIAL NEWS AND RESULTS IN BRIEF

Geevor Pays More.—Although earnings before tax in the year ended March 31, 1957, of Geevor Tin Mines were only marginally higher at £102,670, the company has recommended a bonus distribution of 3d. per unit, making a total of 2s. 6d. for the year (against 2s. 3d. in 1956). Taxation was about £5,000 higher at £58,153 (in other words, over 50 per cent of profit) and £15,701 was transferred to general reserve, now standing at £250,000. At the date of the balance sheet net current assets totalled £386,877. Meeting, London, September 11. Mr. G. W. Simms is chairman.

Writs and Anglo.—"Writs" have accepted an offer from Anglo American to subscribe for 500,000 shares (at the higher of 40s. or 90 per cent of the market price on the allotment date) and also to make available £1,500,000 loan facilities at 6½ per cent, repayable by August, 1967. The arrangements are subject to Writs' shareholders' approval.

Bad Year for Gold Mines of Australia.—In the year ending March 31, 1957, Gold Mines of Australia made a net loss of £4,410. This was largely due to a debit item of £6,988 for depreciation and investigations written off. In the previous year a profit of £1,814 was made. Leases and options at Sandy Creek and Tennant Creek (Lone Star Mine) have been abandoned, but prospecting continues at Stawell. The two for five share exchange offer by Western Mining was considered by the board and recommended for acceptance. Meeting, Melbourne, September 12.

Anglo-Burma Tin.—Anglo-Burma Tin (1956), the joint venture company in which Anglo-Burma Tin has a 49 per cent interest, has issued production figures for the period from October 1, 1955. They show that the company produced 88 tons of concentrates in the year to September, 1956, and 51 tons in the ten months ended July, 1957. In June and July, 1957, 5 and 21 tons were produced respectively. The company hopes to issue regular monthly figures in future.

New Guinea Goldfields to Repay 3d.—New Guinea Goldfields will hold an extraordinary meeting in Sydney on September 4 to make certain amendments to the company's articles of association and to reduce the capital by almost £56,000 by repaying 3d. per stock unit.

Record S.A. Gold Production.—The Transvaal and Orange Free State gold mines during July produced at the record level of 1,479,439 oz. compared with 1,420,021 oz. in June, and 1,369,733 oz. in July, 1956. Total production in 1956 reached the record level of 15,892,935 oz. but as output for the first seven months of this year totalled 9,852,620 oz., there is every prospect that last year's figure will be exceeded.

Mount Morgan Halves Final.—Mount Morgan's profit from ore mined and treated in the year ended June 30, 1957, was £A23,807, but after certain special credits and providing depreciation of £100,000 (1956, £200,000) net profit was £395,048 against £581,533 last year. The

final dividend of 6d. makes a total for the year of 1s. 6d. against two payments of 1s. in 1956.

Ribon Valley Profits Down.—Subject to final audit, Ribon Valley Tinfields made a profit before tax of £10,136 in the year ended March 30, 1957, compared with £21,328 in the preceding year. Taxation took £2,700 (£6,000) and £150 was written off the Wildi project. The dividend recommended is 7½ per cent, absorbing £5,649—in 1956 a single interim of 5 per cent was paid. Meeting, London, September 23.

Modder B. Capital Repayment.—Court sanction has been received for Modderfontein B. Gold Mines' capital repayment (of 9d. per 1s. share). The repayment will become due on September 3.

Kuala Kampar Does Well — Pays More.—Accounts for the year to March 31, 1957, show improved earnings by Kuala Kampar. Increased tin revenue and decreased costs pushed net taxed profits to £454,744 from the 1956 figure of £368,094. A final payment of 3s. is recommended, making a total of 13s. per share for the year, against 8s. 6d. last year. Meeting, Kuala Lumpur, August 28.

Kampong Lanjut Earns More.—Kampong Lanjut made a net taxed profit of £103,242 in the year ended March 31, 1957, a sharp increase over the previous year's £32,170. The dividend is again passed, but £100,000 is put to a dredge reconstruction reserve. Meeting, Kuala Lumpur, August 28.

Kramat Pays Thirty Per Cent.—A dividend of 1s. 6d. per share (1956, nil) is the result of the increase in Kramat Tin's taxed profits from £16,317 to £61,974 in the year ended March 31, 1957. Meeting, Kuala Lumpur, August 28.

Morning Star Reduces Loss.—In the year ended March 31, 1957, Morning Star Mines brought back their net loss from the 1956 figure of £8,382 to £2,449. Revenue from bullion and concentrates almost doubled from £79,323 to £150,615. Meeting, Melbourne, September 9.

Improved Results from Central Victoria.—The net loss of £14,786 incurred in 1956 was turned into a profit of £6,847 in the year to March 31, 1957, by Central Victoria Gold Dredging. However, on April 28, the company's main unit, the Amphitheatre dredge, sank, and operations have been suspended indefinitely. Meeting, Melbourne, September 10. Victoria Gold Dredging, who have surrendered their last mining lease and who have a substantial interest in Central Victoria Dredging are proposing to liquidate at their meeting on the same day. Net liquid assets at March 31, 1957, were £5,325, but there is a further land compensation claim to be settled.

Mining Corporation of Canada.—The Mining Corporation of Canada, who control Normetal, Quemont, Torbrit and Geco mines, say that earnings of their subsidiaries have been seriously affected by the precipitous decreases in metal prices since the beginning of the year. Net operating profits of the three pro-

ducing companies for the half-year were as follows: Normetal, \$542,500; Quemont, \$765,200; Torbrit, \$16,900.

Indian Copper Pays 20 Per Cent Tax Free.—The gross working profit of the Indian Copper Corporation for the calendar year 1956, at £1,507,184 showed a slight improvement over the 1955 figure of £1,474,804. Taxation provisions were higher due to the 1957 budget proposals and that, coupled with the tax provision for the bonus share issue of one-for-two at the close of the year more than offset this gain. However, the company has doubled its final dividend to 13½ per cent per 2s. share which, together with the interim of 6½ per cent, both free of income tax, makes a total of 20 per cent, tax free, for the year. The large expansion programme now under way required the provision for depreciation and to general reserve to be repeated at £175,000 each. The forward balance at the end of 1956 was £114,980 against £117,083 brought in. Mr. P. E. G. W. Parish is chairman. Meeting, Calcutta, September 11.

Galkeno Listing.—The shares of Galkeno Mining of Keno Hill, Yukon Territory, already listed on three major Canadian Exchanges, are now quoted on the New York Stock Exchange.

Trepca and the Pasic Case.—Distribution of Trepca Mines' assets will be further delayed by a formal proof of debt which has been lodged by Mr. R. N. Pasic. The company's liquidator will formally reject this claim and apply for authority to distribute the assets without regard to it, but since the application cannot be heard until at least October 1, there can be no distribution until some time after that date.

Klerksdorp Consolidated's Uranium.—Klerksdorp Consolidated Goldfields announce that "authorized conversations" are in progress with other parties in connection with the company's application to become a uranium producer. In order to reduce possible capital requirements, the company is exploring the possibility of treating its ore in other mines' extraction plants. No decision on the application is likely until this investigation is completed.

Vereinigte Aluminium Werke.—The Vereinigte Aluminium Werke, West Germany's chief producer of aluminium, last year completed post-war reconstruction of its plants, which now have a total productive capacity of about 120,000 tons of aluminium a year. In 1956, the company supplied 105,735 tons of aluminium, produced in its own works or imported, to the domestic market, against 102,519 tons in 1955 and 92,165 tons in 1954. The total West German production last year was almost 150,000 tons. To ensure adequate raw material supplies the company acquired interests in the Greek Delphi Bauxite Mining Co. It has also joined a group of foreign firms engaged in the exploration of bauxite deposits.

FOR SALE: Boyles' X-Ray Drill (½ in. core, 200 ft.) with complete ancillary equipment, including water trailer, sectional hut, and crowns. Condition nearly new. Complete schedule from—The Island Exploration Co., 58 Athol Street, Douglas, Isle of Man.

KENT (F.M.S.) TIN DREDGING, LTD.

MAJOR W. E. HOSKING'S STATEMENT

The thirtieth annual general meeting of Kent (F.M.S.) Tin Dredging, Ltd., was held on August 15, at the Registered Office, Station Hill, Redruth.

Major W. E. Hosking, M.L.M.M. (Chairman) presided.

The following is an extract from his Statement circulated with the Reports and Accounts:—

The Accounts for the financial year ended December 31, 1956, show a profit of £1,160 after payment to the Malayan Government of £20,563 as Royalty on ore sales and the provision of £1,393 for taxation. A sum of £5,251 was written off from Capital Expenditure and the balance unappropriated, which at December 31, 1955, was £31,746, has now been reduced to £27,548 which it is proposed to carry forward. The small profit made did not permit of a dividend being declared.

The Annual Report of our General Managers, Messrs. Osborne & Chappel, circulated with the Accounts, gives comparative statistics and a summary of conditions at the Mine. 1,519,500 cubic yards were treated for the production of 239½ tons of tin ore with a recovery of 0.26 kati per cubic yard. In the previous financial year 1,488,600 cubic yards treated produced 260½ tons of tin ore with a recovery of 0.29 kati per cubic yard. The price received for tin ore averaged £453.3.10 per ton as compared with £425.11.6 per ton for the year ended December 31, 1955. Shareholders have been notified that the output for the first six months of the current year was 120½ tons. In the Chairman's Statement and in the General Managers' Report which accompanied the Accounts for the year ended December 31, 1955, Shareholders were advised of a probable improvement in recoveries with the passage of the dredge in a southerly direction away from the high ground in the north of the

property. The anticipated improvement commenced in June, 1956, and continued for some months, after which there was an increase in the proportion of stiff clay in the ground being dredged and tin recovery became difficult. These adverse factors persisted for the remainder of the year, and until recently, when indications of somewhat easier conditions became apparent. Provided there is no further deterioration in the nature of the ground ahead of the dredge it is reasonable to expect improved returns in the near future.

Satisfactory progress has been made with the boring programme referred to in my Statement last year, but a considerable number of bores remain to be sunk before it will be possible to compute the potential ore reserves in depth and to consider their workability.

Repayment of Capital

At an Extraordinary General Meeting of Shareholders held on November 7, 1956, Special Resolutions were passed approving the Repayment of Capital to the extent of 1s. for each 2s. share issued. The approval of the Court having been obtained, the Repayment was made on February 22, 1957.

Take-Over Bid

In October, 1956, a take-over bid was made by a London Finance House for the whole of the issued Capital of your Company. In the opinion of the Board the offer made was totally unrealistic, and thanks to the confidence shown to the Board by the Shareholders it was rejected by an overwhelming majority. On behalf of the Directors I take this opportunity of thanking Shareholders for their support in this matter.

The Statement of Accounts and Balance Sheet, together with the Director's Report, were received and adopted.

RAND, KLERKSDORP AND O.F.S. GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for the first six months of 1957 and 1956

Heading		Jan. to June	Rand Cos.	Klerksdorp Cos.	O.F.S. Cos.	Total
Tons milled :	Millions	1957 1956	25.5 27.3	2.9 1.9	4.8 4.5	33.2 33.7
Ounces produced :	Millions	1957 1956	5.6 5.7	1.0 0.6	1.8 1.5	8.4 7.8
Grade per ton:	Dwt.	1957 1956	4.2 4.0	7.0 6.3	7.4 6.5	4.9 4.5
Working costs per ton : s.d.		1957 1956	41/11 39/11	52/6 49/10	55/11 52/8	44/10 42/2
Working profits :	Gold £m.	1957 1956	13.9 13.6	4.7 2.8	9.0 6.6	27.6 23.0
Working profits :	Uranium £m.	1957 1956	8.7 8.1	3.9 1.3	3.0 2.1	15.6 11.5
Total profits :	£m.	1957 1956	22.6 21.7	8.6 4.1	12.0 8.7	43.2 34.5
Dividends declared :	£m.	1957 1956	9.6 9.6	3.0 1.3	4.0 2.3	16.6 13.2
Non-European employees at end June		1957 1956	244,000 255,000	35,000 25,000	57,000 55,000	336,000 335,000
Number of Companies included		1957 1956	37 40	7 6	10 11	54 57

QUALIFIED MINERAL DRESSING ENGINEER required for non-metallic flotation and calcining plant at property of G.F.K. Refractories Limited in Kenya. Applicants should preferably possess degree or equivalent with some experience. Continuous contract with two and a half years' tour and four months' leave on full pay. Passage paid both ways, including family after probationary period. Free, furnished quarters provided. Applications, stating full details of age, qualifications and experience, and salary required, marked "Mineral Dressing Engineer", to The Consulting Engineer, New Consolidated Gold Fields Ltd., 49 Moor-gate, London, E.C.2.

ASSISTANT GEOLOGIST required by KUWAIT OIL COMPANY

A University Graduate with an Honours degree in Geology is required by the Company for service in KUWAIT.

Applicants, aged not less than 23 years, should have spent at least 6 months working in subsurface geology including well-siting, sample handling, well-log-ging and report writing.

Salary according to experience but total pay, including local allowance, not less than £1,710 per annum.

Write for application form giving brief details, quoting K.2275, to Box W/10, c/o 191 Gresham House, E.C.2.

SIMON-CARVES LTD. a large firm of designing and contracting engineers require TWO YOUNG ENGINEERS

for design and contract work on coal preparation plant.

Candidates must hold a University degree in either Mining, Fuel Technology or Mechanical Engineering and must have completed National Service. Previous experience is desirable, but not essential. These posts are permanent and pensionable. Starting salaries £750-£1,100, depending on age and experience. Write, quoting Ref. JH 18, to Staff and Training Division, Simon-Carves Ltd., Cheadle Heath, Stockport, Cheshire.

Publications Received

Canada's uranium production is growing in amazing fashion. During the past year over 13,000 tons per day has been added to uranium mines' milling capacity. In terms of dollar value, uranium production is expected to reach \$400,000,000 a year within the next few years, representing an amount equal to one-quarter of the country's present annual total mine production. This, of course, is only a part of the general expansion, which is taking place in the Canadian mining industry. Notable advances are also being made in nickel and iron ore, and despite recently reduced prices, major developments have been planned in the base metals field. In every mining province in the country new sources of mineral wealth are being developed. These are some of the facts revealed by a study of the 1957 edition of *The Canadian Mines Handbook*. In addition to the more than 135 established producers and the hundreds of exploration and development companies, 370 new names have been added. In all, over 8,200 companies are listed. As in previous editions all essential statistical data, including properties and location, officers and directors, history, mine development, earnings and finances, are provided on all major companies. The information is contained in one compact section with companies listed alphabetically. A new feature this year is a 24-page section of maps in two colours, covering the major producing areas. Included also are the special sections "Metal Mines Classified" listing producers and their products, and the eight-year range of mining share prices. *Canadian Mines Handbook 1957* is pub-

lished by Northern Miner Press Ltd., and this year contains 324 pages. Price \$3 per copy for the paper-bound edition and \$5 for the de luxe.

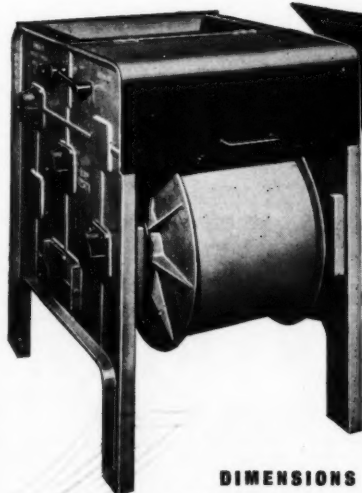
Bulletin No. 13 of the Geological Survey of Great Britain has been published by the Department of Scientific and Industrial Research (H.M.S.O., price 6s. net). The contents comprise the following papers: Divisions of the Coal Measures on Geological Survey Maps of England and Wales; Classification of the Coal Measures of South Wales with special reference to the Upper Coal Measures; New Boreholes into the Lower Coal Measures below the Arley Mine of Lancashire and adjacent areas; and Recent Boreholes into the Lower Coal Measures below the Gellideg-Lower Pumpquart Coal Horizon in South Wales.

A "Guide to the Geological Column," by the late R. L. Sherlock, has been published by the Department of Scientific and Industrial Research. (H.M.S.O., 9d. net). Most people find great difficulty in realizing the enormous periods of time represented by the succession of rocks. The geological column exhibited in the Museum of Practical Geology in South Kensington, London, brings home the differences between geological periods of time. The column is 6½ ft. high, with glass faces illuminated from within, and represents the events of 500,000,000 years. The first face of the column gives the approximate periods of time taken for the formation of the rocks as divided, for convenience into systems. Three

faces set forth the chief facts of evolution under the periods in which they occurred. On the fifth face of the column are recorded a few outstanding events of geological time.

Issued on June, 1957, the 36th annual issue of the *Year Book of the American Bureau of Metal Statistics* covers the year 1956. This international survey is sponsored by the most important producers of copper, lead, and zinc in the U.S., Canada, Mexico, Chile, and Peru. It records for 1956 and the seven preceding years production and other economic statistics, on a world-wide basis, not only of copper, lead and zinc, but also of aluminium and bauxite, gold and silver, tin, antimony, cadmium, cobalt, magnesium, molybdenum, nickel and platinum, and sundry ores and metals. The publication also contains tables of metal prices, lists of metallurgical plants and their capacities, general economic statistics of the U.S., the U.S. duties on principal ore and metal imports, and other extensive data. The price is \$3.00 a copy, post free to the U.S. and Canada; \$3.00 plus 25c. handling and postage to other countries.

Knapp and Bates Ltd. have issued a new brochure describing the operation of their centrifugal pans. Details of water consumption, rate of feed, tyne revolution, slurry density, concentrate discharge and concentration ratios are given, and a keyed diagram and illustrations of static and mobile units are included. This publication has been produced to meet the increasing interest being shown in these pans and may be obtained direct from the company at Africa House, Kingsway, London, W.C.2.



DIMENSIONS

	Height.	Width.	Depth.
Overall Dimensions:	37"	31"	34"
Drum Dimensions:	12" dia.		14" face.
Nett weight:			950 lbs.
Boxed:	1100 lbs.		37 cu. ft.
H.P. Drive: ½			
Total Input:			800 watts.
Distance flange of drum to ground:	12½"		

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- Built in rectifier equipment dispensing with all auxiliary equipment.
- No cams or eccentrics to wear or maintain.
- All rotating parts carried in dust proof totally enclosed deep grooved ball races.
- Built in motor drive with mounted starter and protected fuses.
- All electric impregnated for continuous rating under tropical conditions.
- All working parts and electric totally enclosed giving full protection to the operator.
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Baxter machines are *planned*—on different lines. It's not just that Baxter *build* stonebreakers better—they *design* them better.

For instance, Baxter plant means no wear at all on eccentric shafts and pitmans—*there are none*. Oil consumption is remarkably low. Shafts do not run hot. Direct impact, and consequently wear, are reduced to a minimum. And, most important of all, output in relation to power absorbed is as much as 50% *higher* than with conventional plant.

The secret of Baxter efficiency lies in the Knapping-Motion principle designed into every Baxter Stonebreaker. Imitating the common-sense effort-saving methods of the old stone-breaking craftsmen—cracking, not crushing, the stone—Baxter machines make every ounce of power do a job and a half. And, don't forget, the Baxter *controlled* Knapping Motion gives you a better product—quicker and cheaper. Write for more information about Baxter machines and the way they could help *you*.

It's the Knapping Motion that counts.



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*Write for Baxter Catalogue No. C 118

Tin Output in Tons of Tin Concentrates

Company	April-June	Months since year end	Financial Year to Date		Company	April-June	Months since year end	Financial Year to Date	
			This	Last				This	Last
EASTERN									
Ampat	309½	6	559½	770½	Taipung	165	6	296½	376½
Ayer Hitam	110	12	486½	704½	Tanjong	328	6	685½	731½
Berjantai	355½	2	225	166½	Tekka	43½	3	43½	32½
Chenderiang	42½	3	42½	41½	Tongkah Har.	225½	12	840½	770½
Gopeng Cons.	215½	9	622½	622	Tronoh	625½	6	1361½	1273½
Hongkong Tin	91½	9	268	308½	NIGERIA				
Ipo Tin	72½	3	72½	66½	Amal. Tin	1014	3	1014	992
Kampong Lanjut	199½	3	199½	222	Amal. Tin†	132	3	132	126
Kamunting	526½	3	526½	502½	Bisichi	166	6	367	424½
Kent (F.M.S.)	64½	6	120½	102½	Bisichi†	60	6	119½	179
Kepong D.	91½	12	365½	292½	Ex Lands	145	6	233	286
Killinghall	75½	9	188½	254½	Gold & Base.	242	6	486	337
Kinta Kellas	45	3	45	63½	Gold & Base†	27	6	50	94
Kinta Tin	164	6	360½	213	Jantar	79	9	190	219
Kramat Tin	84½	3	84½	93½	Jantar†	61	9	177	166
Kuala Kampur	401	3	401	594	Jos Tin	33	11	177	114½
Larut Tin	95½	6	192½	346½	Kaduna P.	20½	6	36½	23½
Lower Perak a	216½	2	113½	347½	Kaduna S.	62	6	152½	186½
Malayan Tin	465½	12	2129½	3200½	Keffi	22	3	22	4
Malaysiam	31½	3	31½	27	Keffi†	0	3	0	26
Pengkalan	124½	9	364½	436½	London Nig.	64	3	64	25
Petaling b	332½	8	916½	938½	London Nig.†	0	3	0	1½
Puket Tin	152	6	302½	271½	Naraguta Ex.	57½	6	109½	87½
Rahman H.	87½	12	333	370½	Naraguta K.	21	6	47½	62½
Rambutan	42	12	173½	204	Naraguta Tin	41½	6	123½	65½
Rantau	232½	12	917½	656	Naraguta Tin†	5	6	31½	39½
Renong	162½	12	699½	760½	Ribon	50	3	50	38½
Selayang	44	9	166	169	Ribon†	0	3	0	8½
S. Kinta c	1003½	3	1003½	916½	Tinfields of Nig.	10½	3	10½	3½
S. Malayan	535½	12	2418½	2731½	U. Tin	13	3	13	25
Siamese Tin	798	6	1530½	1711	U. Tin†	1	3	1	18½
S. Tronoh	238½	6	449½	332½	MISC.				
Sungei Besi	318	3	318	274½	Rootberg	284	12	1129	1296
Sungei Kinta	59	6	156½	184½	S. Croft Tin	189½	6	379½	368½
Sungei Way d	399½	12	1414½	1419½	S. Croft Tin†	1	6	1	5½

* Quarterly

† Columbite

†† Wolfram

a Dredge crossing tailings at flotation depth.

b No. 4 Dredge resumed April 16; No. 6 entered tailings in May.

c Consolidated Rasa dredge commenced commercial operations May 1.

d Dredge 1A resumed working April 12

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